

Integrated Microchannel Reformer/Hydrogen Purifier for Fuel Cell Power Systems, Phase I

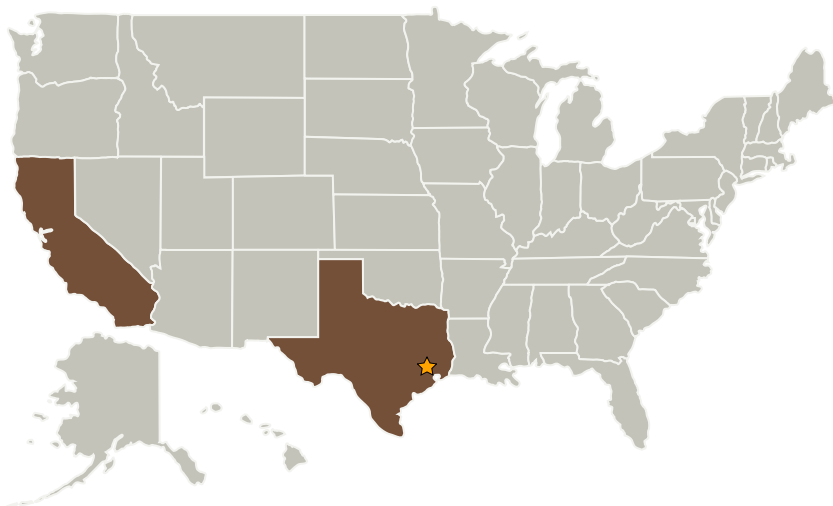
Completed Technology Project (2005 - 2005)



Project Introduction

Makel Engineering, Inc. (MEI) and Colorado School of Mines (CSM) propose to develop an integrated hydrogen generator and purifier system for conversion of in-situ produced hydrocarbons to fuel-cell-grade hydrogen. NASA is currently developing several In Situ Resources Utilization (ISRU) Systems. One technology commonly found in most ISRU scenarios is the use of the Sabatier reaction and water electrolysis to produce methane and oxygen. Due to the various penalties of storing gaseous hydrogen on-board the rover, it is advantageous to carry methane instead of hydrogen and to have an on-board reformer to produce hydrogen on-demand for the fuel cell. Proton exchange membrane (PEM) fuel cells hydrogen with very low carbon monoxide content (typically less than 10 ppm). The proposed system will combine microchannel microreformer technology for hydrogen production with palladium membranes technology for hydrogen purification and separation in an integrated hydrogen production system, resulting in optimized size and energy efficiency. This proposal will seek to establish the feasibility of using compact microchannel/membrane reactor systems to provide purified hydrogen for fuel cell power systems for applications such as robotic and crew transportation rovers.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Makel Engineering, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Chico, California

Primary U.S. Work Locations

California	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Darby Makel

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.1 In-Situ Resource Utilization
 - └ TX07.1.4 Resource Processing for Production of Manufacturing, Construction, and Energy Storage Feedstock Materials